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ABSTRACT

This case study investigated educators as they learned about, embraced, and attempted to implement information technologies. It describes the systems that foster continuing use and the implementation successes and difficulties. This was accomplished by documenting one group of educators enrolled in an intensive graduate course about educational telecommunication, by monitoring individual and group experiences during the course, and by following these educators as they attempted to integrate their skills and knowledge in their school settings and with colleagues. The participants learned to use the internet to investigate subject specific resources, joined listservs, and used tools such as Gopher, telnet, FTP (File Transfer Protocol), WAIS, Veronica, Mosaic, and CU-SeeMe to enhance their exploration. As instructor, the researcher became a participant observer for both classroom and electronic interactions, and a reflective journal was kept throughout the life of the project. Prior to the beginning of the seminar, participants completed surveys to assess their initial knowledge of telecommunications and to determine their expectations. Participants maintained reflective journals and daily logs as they investigated and explored various telecommunications resources. Formal and informal interviews were conducted individually and in groups, and semi-structured questionnaires were sent to participants several months after the seminar ended. The paper provides insights into the current status of information technologies in a rural region, describes the stories of these individuals, and offers recommendations for increased success in future implementation efforts. (Contains 14 references.) (MAS)

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Telecommunications for Personal and Professional Uses: A Case Study

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Telecommunications for Personal and Professional Uses: A Case Study

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Abstract: This case study investigated educators as they learned about, embraced, and attempted to implement information technologies. It describes the systems that foster continuing use and the implementation successes and difficulties. This was accomplished by documenting one group of educators enrolled in an intensive graduate course about educational telecommunication, by monitoring individual and group experiences during the course, and by following these educators as they attempted to integrate their skills and knowledge in their school settings and with colleagues. The paper provides insights into the current status of information technologies in a rural region, describes the stories of these individuals, and offers recommendations for increased success in future implementation efforts.

Telecommunications for Personal and Professional Uses:

A Case Study

Introduction

As the world moves into the Information age, telecommunication networks have the potential to change the nature of teaching and learning in all aspects of education. Calls abound for education graduates and practicing teachers to join the information age by using telecommunications technologies for professional development and incorporating them into curricular instruction for students. Although everyone is expected to possess and use the skills necessary to move into the 21st century, few educators have had the opportunities and experiences necessary for successful implementation. Efforts are currently underway to increase the historically poor implementation record for technological innovations.

The purpose of this research was to document the efforts of a department of teacher education to introduce telecommunications to inservice educators, identify support and technological needs for successful implementation, and inform policy for future practice. This was accomplished in a case study of one graduate seminar, Educational Telecommunications and Distance Learning, by investigating the factors that contribute to, or interfere with, educators learning and using information technologies. The study followed individual and group experiences throughout the seminar and maintained contact with these individuals during the ensuing months. It provides a description of the systems involved in the implementation process.

Statement of the Problem

Introducing information technologies to practicing teachers is a non-trivial task. Teacher education institutions and schools in general have not done enough to support and encourage a thoughtful use of technologies to enhance the teaching and learning process (Glenn, 1993). The

problem is perhaps more systemic than one might imagine. La Follette found, "Nearly universal agreement that many technologies which have been quite successful in society have had only limited impact on the educational environment" (1992, p. 120). Use of educational telecommunication networks can encourage social, collegial, and professional development activities (Schrum, 1993), but unless educators have the supports necessary to persist, they may lose these potential advantages.

The United States Federal government plans for every classroom to be connected to the Information Superhighway within a few years; from the literature, similar goals abound throughout the world (Collis, 1994), and as of September, 1994, at least 237 countries already have access to the Internet (Calcari, 1994). Unfortunately, current educators, and even most preservice teachers, are not ready to use this coming innovation. Professional educators require substantial support to learn about and use the tools and resources of the information age (Cuban, 1986; Honey & Henriquez, 1993; Schrum, 1993). This discrepancy between expectation and reality has led to frequent calls for improving educator skills and equally frequent complaints about the difficulty of implementing educational technology projects.

Advantages of using information technologies are numerous. Students in rural and urban regions can benefit from their teachers' enhanced professional development and access to teaching resources. Electronic network resources, such as preservice/in-service collaborative discussions, policy archives, educational databases, space and weather photos, and international libraries, all of which can be accessed through the Internet, offer a wealth of resources for teachers. Using relatively simple equipment from the most isolated of schools and communities, these resources can help change the learning process from passive to active. Electronic networks and other advanced information technologies make it possible for teachers to share resources and ideas quickly and easily over long distances and reduce the isolation associated with teaching (Schrum, 1993).

In a large study of frequent telecommunication using educators, Honey and Henriquez described technologically proficient individuals, mostly self taught, who felt highly motivated to

learn and use this technology. They also found the most persistent obstacles were teacher training and support, time for professional and student learning activities, and school/district planning for use of telecommunications in instruction and administration (1993). They identified the difficulties of bringing less technologically sophisticated individuals into the information age. This is significant in light of studies that suggest enormous amounts of time and support are necessary just to reduce anxiety toward the hardware, much less to become confident and competent in making wise use of that technology in teaching and learning (Beasley, & Sutton, 1993).

While it is important to describe and characterize groups of educators committed to using telecommunications, it is equally important to understand the processes by which individuals embrace the innovations and to determine ways in which educational institutions might support others to reach that goal. Toward that end, this researcher offered an intense graduate seminar, Educational Telecommunications and Distance Learning, to rural educators as part of a research study. The questions that guided this study included:

- (1) What factors supported and encouraged educators' decision and efforts to learn information technologies?
- (2) What obstacles and problems existed that interfered with educators learning about and using information technologies for professional and curricular activities?
- (3) In what specific ways did educators continue to use the skills and knowledge after the seminar?
- (4) What support and facilities are necessary to encourage long term adoption of information technologies in professional and personal activities?

A course was offered in an intensive, five-week format, in which students met twice a week for five hours each session. The course was offered by a small college in a rural area of northern New York State. The region is vast, sparsely populated, severely climate impacted during seven months of the year, and has a high unemployment pattern. Telecommunications was of interest to the area because it could provide a natural solution in which educators could reduce the isolation and remain current on curricular developments.

In this course students learned to interact with colleagues and the professor through electronic mail to clarify assignments, discuss readings, and facilitate group projects. They

developed curricular activities and lessons that explored the unique characteristics of telecommunications. They also learned to use the Internet to investigate subject specific resources, joined listserves, used tools to enhance their exploration (Telnet, FTP, Gopher, WAIS, Veronica, Mosaic, CU-See Me), and shared what they learned with others. They completed research assignments using on-line resources. In addition, they studied and watched examples of current programming delivered via distance learning technologies.

Methods and Data Sources

Telecommunication for educational purposes has been used for many years in university settings; in preservice and inservice education, however, it is still more the exception than the rule (Schrum, 1991). Individuals who chose to take a course on this subject represent a unique population, and it was important to gather information about their motivation, interests, and the processes by which their learning took place. Additionally, it was important to gain insight directly from them.

The researcher chose a case study approach to investigate this emerging phenomenon. Qualitative methods "are a source of well-grounded, rich descriptions and explanations of processes occurring in local contexts" (Miles & Huberman, 1984, p. 15). Moreover, investigations into teacher education and technological use "seek to understand individual teachers and teacher educators, their personal instructional decisions, and their unique classroom cultures as related to technology use" (Novak-Aitken, 1993, p. 103). A nonpositivistic research design and naturalistic approach were appropriate for this study.

The researcher used ethnographic techniques to study the learners in this course. As instructor, the researcher became a participant observer for both classroom and electronic interactions. In addition, as is recommended, the researcher keep a reflexive journal throughout the life of the project (Erlandson, Harris, Skipper, & Allen, 1993; Lincoln & Guba, 1985). This was done to contribute to the reliability and objectivity of the research results.

Prior to the beginning of the seminar, participants completed surveys to assess their initial knowledge of telecommunications and to determine their expectations. Participants maintained reflective journals and daily logs as they investigated and explored various telecommunications resources. They electronically shared information with the class, collaboratively found and evaluated research, and communicated with educators around the world. Participants were asked to provide copies of their electronic research, listserv memberships, and discussions to the researcher.

Formal and informal interviews were conducted, individually and in small groups, during and following the seminar. Semi-structured questionnaires were sent to the participants several months after the seminar ended. Document collection included feedback from logs and reflective journals, group and individual electronic communications, and letter exchange after the course ended.

Discussion

Who were the participants?

Large scale studies have found that, contrary to expectation, the most committed users of telecommunications or computers are experienced and mature educators, (Honey & Henriquez, 1993; Sheingold & Hadley, 1990) and this study's participants were similar to those described in these studies. Of the fourteen individuals, nine women and five men, one was under 25 years of age, three were between 30 and 40, and the others were between 40 and retirement. Five had experience ranging from 5 to 10 years, and the more mature had completed over 20 years of teaching, on average.

Ten of the group were practicing educators from primarily rural school districts who taught a variety of grade levels and subject areas. One person was a full time graduate education student. Those not engaged directly in teaching were in some manner connected to education. One woman worked in a public service agency, one provided technology inservice to educators in the community, and another worked as a support person for technology services. Their knowledge

of technology ranged from novice to experienced, and several had not used the Macintosh platform prior to entering the class. Their experience with telecommunications ranged widely too. Over half of them had never sent an electronic mail message while a few were using electronic mail comfortably on a variety of networks. A few had watched demonstrations of the Internet during workshops or at conferences.

Description of the Course

The focus of the course was to encourage purposeful exploration of educational telecommunications for professional and instructional activities. This took place almost exclusively on the Internet. Each participant identified issues of need, concern, or personal interest, and began investigating them. These focused primarily on curricular activities such as science, math, and social studies, although some individuals looked extensively at professional development concerns such as models of school restructuring, teacher burn-out, or how to begin a dialogue among physical education teachers.

A simple program on the university mainframe made it possible to search all listserves using Boolean strategies; as a result the individuals were able to find electronic discussion groups to meet their needs. The woman from the social service agency found a listserve devoted to child support issues and the teacher educator found one that promoted discussions among preservice teachers. Students chose listserves primarily for educational purposes, but they also discovered some for fun, such as a popular one focused on the Montreal Canadiens and another entitled "Humor."

Class members learned to use the Gopher program to roam the world looking for interesting articles or information. They used the Telnet functions to log on to remote computers. They practiced FTP (File Transfer Protocol) from remote locations and garnered photos of the moon, detailed maps of our geographic region, and Hypercard stacks to teach scientific principles. They were able to access the World Wide Web, thus joining the newest explosion on the Internet with its rich format and multimedia information. With a flexible video camera, CU-See Me software,

and recent models of multimedia computers, we were also able to enter the world of desktop video conferencing.

Participants kept a log throughout the five weeks in order to chronicle their successful, and not so successful, adventures in exploring the Internet. They also kept a reflective journal to describe their emotional and philosophical thoughts. They kept in contact with each other using private e-mail and distribution lists. Weekly assignments were turned in using electronic mail, and individuals posted new discoveries of resources for the entire class. Descriptions of these five weeks ranged from "energizing and exciting" to "overload" and "overwhelmed" but no one dropped the course.

Guiding Questions

The participants in this study have a great deal to share with us about learning and implementing telecommunications in schools. Through a series of discussions during and following the course, electronic and telephone interviews, and other personal exchanges, the story of their adventures has emerged. The voices of these educators reflect their commitment and resourcefulness, and also tell a good deal about schools and innovation.

What factors supported and encouraged educators' decision and efforts to learn information technologies? The students' reasons for taking this seminar were remarkably similar. They wanted to be on the cutting edge of the information explosion, feel personally competent, provide new skills to their students, and for a large percentage of them, create new opportunities for career moves. A strongly functioning community of learners, which developed among the group, was one of the most striking outcomes of the course. Individuals described themselves as "pioneers," "innovators," and "fanatics," and felt they were "joined at the hip for this adventure." Many drove over an hour each way, after a full day of teaching, to participate. They eagerly assisted each other, shared information, and provided support during difficult times. Due to the small number of participants, and the nature of the collegial interaction, they became familiar with each others' interests and frequently discovered electronic gems for each other. Although the course

was offered during the closing weeks of the school year, perhaps the busiest time for any teacher, every participant expended an enormous amount of time.

Throughout the five weeks, those with a computer, modem, and local dial up access to the college mainframe reported the most success. They were able to logon and roam the Internet at their own convenience. Those with little access, approximately half the participants, made less progress since they were limited to open lab hours. These were the same individuals who had not been successful in learning about telecommunications on their own. Their initial time during each class was often spent reviewing what they had done during the previous class session. These individuals began coming to class early to work in our electronic classroom. By the second week most of the participants strongly urged that we arrange more "open lab hours" in which they could work together, and by the last week they were crowded around terminals almost every spare moment.

What obstacles and problems existed that interfered with educators learning about and using information technologies for professional and instructional activities? Every student in the seminar identified the lack of sufficient time as the major obstacle that had kept them from learning about information technologies, or from becoming proficient at it. Throughout the five weeks of the course they stated repeatedly that until the course there had not been enough time to explore, make mistakes, and reflect on their individual and group experiences.

One teacher said, "I don't usually just sit around trying things on my own, because time is so scarce. I have had that luxury here, and appreciate knowing that I am not just wasting time, but that this is all part of learning about telecommunications." Several students commented in their journals about the vast amount of information they wanted to learn, and described the steep learning curve. Over the weeks, the logs of the majority of the students reflected growing confidence and increasing numbers of successful explorations. One said, "I feel like a person who has been on the desert, and suddenly I can have as much water as I want." Students with family obligations stated they felt extreme pressure and had needed extra understanding and patience during the five weeks and beyond from the family members.

The problem of time continued to plague these educators after school or work resumed in the autumn. One educator said, "My job is such that I cannot even get time in my day to phone the parents of students. When do I get to continue the exploration I need to use this?" Another educator, from a rural school, commented, "Time is really the biggest obstacle right now. It's almost impossible to find uninterrupted time during the day to go on-line. When I do manage to get on, the old dollar signs keep spinning by so I always feel rushed."

The second most frequently mentioned obstacle was access. One library media specialist said, "I have talked with many of my colleagues about it. One of our biggest problems is lack of access. I have the only modem in the building and the only Internet account. It is tough to get time to use the computers during the day." Another educator noted, "I do not even have access to a computer for word processing. My science department does not have one, so I have been very frustrated." The woman from the social services department felt that telecommunications had great potential for her work, however, she reported, "I cannot use the Internet from work, and my supervisor does not really want me to try new things at all. I feel I need a lot more time to learn about what I can do on my own."

The third obstacle mentioned was limited resources. Budgets are tight in this rural area, and schools are forced to limit what is purchased. One science teacher explained, "My administrator thinks this is a great idea, but we had a budget cut right after I took this class. We can't spend money for anything, and so I have not been able to implement any of the ideas that I had." Another teacher explained, "If I want to do any telecommunicating, I will have to write a grant to fund it. My colleagues are also interested, but the school district cannot pay even the small long distance charge to dial into the college mainframe." One other commented, "I have discussed with colleagues my class experiences, but for the most part, they are not interested. We have no money, use of the equipment is not convenient, and some maintain there is not even enough time to cover mandated curricula!"

In what specific ways did educators continue to use the skills and knowledge after the course? At the end of the course, these learners were overwhelmingly excited and enthusiastic

about introducing telecommunications to their colleagues, students, and professional communities. As an exit activity each student described his/her plans for implementing telecommunications into the classroom or other educational setting. Their goals were ambitious and they were vigorously determined. A science teacher in a very isolated school planned to contact the local technology industry for assistance in funding. One participant was determined to transform a traditional mail exchange between native French speakers and native English speakers into an electronic one. The teacher educator had expansive plans to integrate secondary methods and materials with telecommunications for professional development. One teacher was ready to begin setting up a connection for physical education teachers so that they could discuss mutual issues.

Several months after the course ended, a wide disparity existed regarding the participants' use of telecommunications. One participant said, "Well, I do my banking electronically! Actually, I do get to keep up with my e-mail, but my access is very limited." Another told me, "I don't get to do anything right now." Some had more positive reports. They described research for themselves and for others at their building, communicating with colleagues around the country, signing students up to participate in science experiments, and registering electronically for a workshop. One proudly stated, "I use e-mail every day to communicate with other libraries in northern New York. I do some searching on the databases on Dialog and on AOL (America On Line)." Overall, the most committed users were those who had already established some electronic communications from their homes or workplace.

An equally large discrepancy exists between their goals at the end of the course and the level of implementation six months later. When asked to compare what they are doing with what they hoped they would be doing, the answers again ranged from "I never thought I could have grown stale at this stuff," to "Well, I thought I would be able to implement more activities and there have been problems." One participant had her computer and modem zapped by lightening and months later was still trying to find someone to fix them.

Others expressed equal frustration. A media specialist explained, "My expectations involved becoming more adept at using the Internet and introducing telecommunications to my students, staff, and administration. I was also going to sign up for the LINK (a regional network), buy a modem for home, and use it to go on-line." She still has not purchased the modem for home, but has begun to look for one. A high school science teacher said, "I have written a mini grant and contacted two other teachers to do some research. I had hoped to be able to use the Internet much more than I have so far. Cost is a large factor. I am still unhappy that we must pay such huge phone bills to do what many other people are doing virtually free."

A few were able to implement scaled down versions of their plans. One science teacher completed the design of a project on weather with a teacher in another state, and was certain that it would take place. A computer coordinator included a component of telecommunications into her entire middle school curriculum. Three teachers were writing grants for telecommunication equipment and connect charges.

Overall, the teachers who have done the least have managed to maintain enthusiasm and appear determined to eventually get what they need. Over half of the participants reflected that they had gained enormous personal satisfaction in learning about telecommunications, and that their confidence in technology had increased. One person said, "I keep working on this, and will not give up. I told my administrator that I could help figure out an e-mail system, but so far have not had that offer acknowledged. But I can be very stubborn."

What support and facilities are necessary to encourage long term adoption of information technologies in professional and personal activities? Given the difficulties in implementation encountered by the majority of these educators, it is important to ask ourselves what can be done to encourage the adoption and use of information technologies to enhance teaching and learning. While the problem may appear overwhelming, if we look at the obstacles these individuals encountered we have a place to begin.

Time to explore, digest, and experiment is perhaps the most critical need cited by these educators. There seems to be no easy way to find the time, unless it is built into the school day,

or unless educators have equipment at home. Without administrative support for this exploration, skills will not evolve quickly, or in some cases, at all. Several participants made comments similar to what a media specialist said,

Everything took so much more time than I thought it would. I spent hours one night looking around the Internet, and I ended up without one good resource. It was frustrating, but I learned so much. I guess everyone needs to have time to explore that way.

One reflected the opinion of many when she said, "When you teach five - seven classes a day, it's hard to find time to do all of the stuff that would really count. I don't have a computer in my class, then when I am free to use the lab, it has students in it." Time to learn is one factor, but time to maintain skills is also important. One individual commented, "I talked about our class during a discussion on using Internet at a library meeting. We all decided its nice and we need lots more time and training. I hate to admit how much I've forgotten by not using it over the summer." Another educator said, "I rarely get to use what I learned over the summer, so when I do have the chance, I find that my mind has rusted shut. Perhaps a refresher course would help?"

Several individuals assumed informal leadership roles in promoting the uses of telecommunications in their schools. These people recognize a lack of support among their colleagues, and although it has been frustrating, they continue to work to generate interest. One educator commented, "I believe that many teachers think that to use telecommunications would be to add one more content area, one more course, one more task to accomplish. They do not understand that in some areas using telecommunications can be a more efficient and effective way do what they are already doing."

Another said,

I talked A LOT about my experience in the class and most people renewed or expressed interest in learning more about telecommunications. I am still drawing on what I learned from you to answer all kinds of questions for my colleagues, from basic stuff to technical things. However, I do live in quite a rural area and like other family and friends, teachers either seem disinterested at this time, or sort of fearful. I think its because first of all they don't know computers, but also because they don't really understand the concept, and how exciting and powerful it all is.

Next, educators must have ready access to equipment. Access can be shared among several teachers, or could be located in a teacher work room, but it must be relatively convenient. This

may appear to be so obvious as to not bear repeating, however, many educators are still struggling for access to computers and their plight must be considered. One educator summed up her frustration,

The reality is that teachers are not going to use this powerful reference and interactive technology until it is fairly easy to get to. I have given up expecting to have a telephone, but if my colleagues could sit at a terminal in the work room, log on and find a resource for something they are studying in class, they would do it.

Finally, educators must have resources if they are going to begin to use and incorporate information technologies into their professional and instructional activities. These resources include funds for professional development, innovative practices, and materials. Resources will not be allocated without support from administrators. One teacher told of an administrator who is very excited by the possibilities in the field of telecommunication access for her rural district. She encourages exploration of the networks and integration into curricular practices, and even sent this educator to a conference about telecommunications. Other administrators were not so eager. While several participants were given recognition for their initiative, that did not typically translate into a commitment of resources. Most of the participants in this course complained that they had to fight for very limited resources, and frequently were expected to dig deeply into their own pockets. One teacher, in the language of her new interest, commented,

<FLAME ON> It has taken me eight months to get the okay to pay for three trial months of Internet at school (\$75). I used up a free month on CompuServe and a free month on AOL. I have already bought books and a video tape out of my own money. I think my examples make my point.<FLAME OFF>

Recommendations and conclusions

The voices and stories of these individuals provided rich descriptions of the realities faced by rural educators in attempting to join the information age by taking an intensive course in educational telecommunications. These educators then tried to implement their new knowledge for personal and professional activities.

It would be very easy to declare the project a failure, because progress was not as dramatic as planned. Instead, it is more valuable to recognize the successes among this group. Although

most have not reached their goals, nor fully implemented their projects and plans, they have definitely not given up. Every individual, with one or two exceptions, has continued to explore, read, experiment, and work to implement information technologies in whatever ways they have available. The support systems developed during the course were well established and efforts have continued to maintain these informal collaborations. This collaborative support has been hampered by limited access to each other via telecommunications after the course ended. These problems are not limited to our rural communities, but they may be exacerbated by the geographic distances.

Students identified many obstacles that interfere with educators learning about and using information technologies in their schools. They cited lack of time, access, and resources and they recognized the irony. One described it as, "Sort of a Catch-22. When I do get the time and access, the resources are too limited. It is lack of time, money and expertise." Another described a relatively modest wish, "My dream would be to have a computer, modem, phone line in my classroom AND money for student accounts and telephone line charges." Perhaps it is time that we stop expecting teachers to make the improvements on their own, and instead expect school districts, state, provincial or federal departments of education, and universities to provide ongoing and collaborative assistance.

A study such as this must do more than report the difficulties; it must offer some suggestions to remedy these identified situations. What then can the educational community do to promote the use of information technologies for professional and instructional activities? Graduate courses, no matter how intense, collaborative, or instructionally sound, are not enough.

Core groups of educators must be supported with time, access, resources, and administrative support if they are to become leaders in implementing telecommunications. Colleges of education, in conjunction with school districts, must be willing to make an investment in these areas. Follow-up support is necessary to maintain the progress and momentum. Institutionalization of curricular expectations will promote use of information technology.

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